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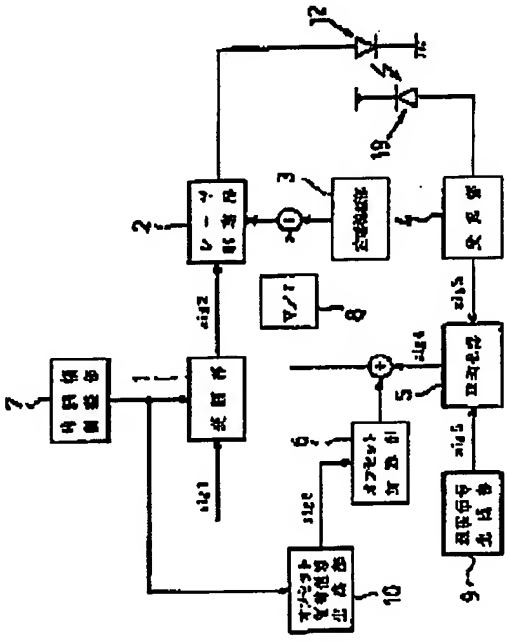
(54) CONTROL DEVICE FOR OUTPUT OF LASER

(57)Abstract:
PROBLEM TO BE SOLVED: To obtain a control device by which a laser can be controlled to optimum laser light-emitting power always at low costs when information is recorded on, or reproduced from, an optical disk in a format by a CLV system by an optical-disk rotation control system other than the CLV system such as a CAV system or the like.
SOLUTION: A modulation part 1 modulates the control signal of the laser driving current of a laser diode 12 by a laser drive part 2 according to information to be recorded on a recording medium. A laser beam which is output from the laser diode 12 is received by a photodetector 19. The laser beam is converted into an electric signal by a light receiving part 4. The frequency characteristic of an averaging part 5 is changed by a speed signal sig5 from a speed-signal generation part 9. The averaging part 5 averages the electric signal which is converted by the light receiving part 4. The laser driving current is changed according to the averaged electric signal.



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CLAIMS

[Claim(s)]
[Claim 1] A modulation means to modulate the control signal of the laser drive current of a semiconductor laser component according to the information recorded on a record medium, A light-receiving means to receive the laser beam outputted from said semiconductor laser component, and to change into an electrical signal, In the laser power control device equipped with an equalization means to equalize the electrical signal changed by this means, and the control means which changes said laser drive current according to the electrical signal equalized by this means The laser power control device characterized by establishing the means which makes the frequency characteristics of said equalization means adjustable.
[Claim 2] The laser power control device characterized by establishing a radius location detection means to detect the radius location of the condensing point of the laser beam on said record medium, and a means to change the frequency characteristics of said equalization means according to the radius location detected by this means, in a laser power control device according to claim 1.
[Claim 3] The laser power control device characterized by establishing a rotational-speed detection means to detect the rotation information currently recorded on said record medium in a laser power control device according to claim 1, and a means to change the frequency characteristics of said equalization means according to the rotation information detected by this means.
[Claim 4] The laser power control device characterized by establishing an offset addition means to add offset to the electrical signal equalized by said equalization means in a laser power control device according to claim 2, and a means to change the amount of offset added with this means according to the radius location detected by said radius location detection means.
[Claim 5] The laser power control device characterized by establishing an offset addition means to add offset to the electrical signal equalized by said equalization means in a laser power control device according to claim 3, and a means to change the amount of offset added with this means according to the rotation information detected by said rotational-speed detection means.
[Claim 6] The laser power control device characterized by to establish an offset addition means add offset to the electrical signal equalized by said equalization means in a laser power control device according to claim 2 or 3, a time-amount width-of-face adjustment means change the time-amount width of face of the control signal of the laser drive current modulated by said modulation means, and a means change the amount of offset according to the control signal with which time-amount width of face was changed with this means.
[Claim 7] In a laser power control device given in claim 1 thru/or any 1 term of 6 An optical-system means to irradiate a part of laser beam on said photo detector while condensing a laser beam on said record medium and condensing the reflected light from said record medium again on other different photo detectors from said photo detector, A playback means to detect the information on said record medium from a photo detector besides the above, A servo signal operation means to detect the positional information of said record medium and the condensed laser beam from a photo detector besides the above, A servo means to control the location of the laser beam on said record medium based on said positional information, The laser power

control device characterized by establishing the device system means to which the location of said laser beam is moved, carrying out outgoing radiation of the laser beam from said semiconductor laser component based on said laser driving signal, and recording information on said record medium.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to the laser power control device to which a recording rate is changed at the time of the information record to a record medium (media) in information record regenerative apparatus, such as optical disk drives, such as a phase change mold, and MO, WORM.
[0002]
[Description of the Prior Art] Since it is very sensitive to fluctuation of record power, it is necessary to supervise laser luminescence power and to maintain to fixed record power also during record, in record to a record medium (optical disk), and in order to form a record mark with high precision, the complicated optical power modulation is performed. Since such a complicated optical power modulation is performed, in order to detect all luminescence power, a high-speed detector and a high-speed control system are needed, and it will become expensive.
[0003] Then, conventionally, modulation data are superimposed, the laser beam which carried out the optical power modulation is equalized, a low-pass component is detected, and the method (for example, refer to JP,4-67260,B) which controls laser luminescence power by the control system carried out slowly is proposed. Moreover, the semi-conductor light emitting device output control of three or more values is possible, and the method (for example, refer to JP,8-96364,A) of the laser luminescence power average value control in the phase change media which enabled it to lower a photodetector military requirement is also proposed.
[0004] That is, by these methods, the laser output fluctuation of a low-pass component based on media rotation, a temperature change, etc. is detected, and the equalization means is equalizing the optical power modulation component of a reference clock frequency band based on the laser output fluctuation. According to such a conventional method, control of laser luminescence power is realizable by low cost.
[0005] By the way, in the current optical disk, a constant angular velocity rotary system ("CAV" is called) and a constant linear velocity rotary system ("CLV" is called) exist as a rotary system of an optical disk, and the ZCAV method and ZCLV method which combined those methods are also proposed.
[0006] The ZCAV method and ZCLV method divide an optical disk into radial in some zones, and are a method controlled by CAV or CLV, respectively in each zone. For example, the media format of CD, DVD, etc. represented as multimedia is CLV.
[0007] Since a format of the optical disk by this CLV can record inner circumference and a periphery with the same recording density, it is fit for large capacity-ization. However, since rotational speed also needed to be changed when the radius location to access changed, access was slow, the gear change control which changes rotational speed was difficult, and there was a problem that power consumption was large.
[0008] On the other hand, since linear velocity is as early as a periphery, recording density becomes coarse and does not turn [format / of the optical disk by CAV] to large capacity-ization, but since rotational speed is fixed, it does not have the latency time by gear change, and has the advantage that access is early.

[0009] Therefore, recently, the method which records and reproduces information by the roll control according the optical disk in the format by CLV to CAV is used. Since an informational recording rate and reproduction speed are changed with the radius location of an optical disk in the case of this method, record and in order to reproduce, it is necessary to change the frequency of the signal (clock) used as criteria.
[0010] Thus, since a clock frequency changes with the access radius of an optical disk when recording and reproducing information by the roll control according the optical disk formatted by CLV to CAV, optical power modulation frequency changes and a media rotational frequency also changes in the case where information is recorded and reproduced by the roll control by the ZCLV method or the ZCAV method.
[0011]
[Problem(s) to be Solved by the Invention] however, like the control system of the conventional laser luminescence power mentioned above If the frequency characteristics of an equalization means are made immobilization, when information will be recorded and reproduced by the roll control according the optical disk formatted by CLV to CAV, For example, since a laser power control band becomes very low compared with informational record reproduction speed on a periphery when an adjustment value is fixed to inner circumference side record reproduction speed The amount of information recorded or reproduced after laser power has shifted from the optimum value increased, and there was a problem that exact record and playback could not be performed.
[0012] Moreover, when an adjustment value was fixed to periphery side record reproduction speed, in inner circumference, an optical power modulation component would not decline and there was a problem of becoming the lack of equalization. Thus, with the equalization means which made frequency characteristics immobilization, there was a problem that always optimal laser luminescence power control could not be performed.
[0013] When this invention is made in view of the above-mentioned point and information is recorded or reproduced by optical disk roll control methods other than CLV, such as CAV, to the optical disk in the format by CLV, it aims at enabling it to control by low cost to the always optimal laser luminescence power.
[0014]
[Means for Solving the Problem] A modulation means to modulate the control signal of the laser drive current of a semiconductor laser component according to the information recorded on a record medium in order that this invention may attain the above-mentioned purpose, A light-receiving means to receive the laser beam outputted from the above-mentioned semiconductor laser component, and to change into an electrical signal, In the laser power control device equipped with an equalization means to equalize the electrical signal changed by the means, and the control means which changes the above-mentioned laser drive current according to the electrical signal equalized by the means, the means which makes adjustable the frequency characteristics of the above-mentioned equalization means is established.
[0015] Moreover, in the above laser power control devices, it is good to establish a radius location detection means to detect the radius location of the condensing point of the laser beam on the above-mentioned record medium, and a means to change the frequency characteristics of the above-mentioned equalization means according to the radius location detected by the means.
[0016] Furthermore, in the above laser power control devices, it is good to establish a rotational-speed detection means to detect the rotation information currently recorded on the above-mentioned record medium, and a means to change the frequency characteristics of the above-mentioned equalization means according to the rotation information detected by the means.
[0017] Moreover, in the above laser power control devices, it is good to establish an offset addition means to add offset to the electrical signal equalized by the above-mentioned equalization means, and a means to change the amount of offset added with the means according to the radius location detected by the above-mentioned radius location detection means.

[0018] Furthermore, in the above laser power control devices, it is good to establish an offset addition means to add offset to the electrical signal equalized by the above-mentioned equalization means, and a means to change the amount of offset added with the means according to the rotation information detected by the above-mentioned rotational-speed detection means.
[0019] Moreover, in the above laser power control devices, it is good to establish an offset addition means to add offset to the electrical signal equalized by the above-mentioned equalization means, a time amount width-of-face adjustment means change the time amount width of face of the control signal of the laser drive current modulated by the above-mentioned modulation means, and a means change the amount of offset according to the control signal with which time amount width of face was changed with the means.
[0020] Furthermore, in the above laser power control devices, a laser beam is condensed on the above-mentioned record medium. An optical-system means to irradiate a part of laser beam on the above-mentioned photo detector while condensing again the reflected light from the above-mentioned record medium on other different photo detectors from the above-mentioned photo detector, A playback means to detect the information on the above-mentioned record medium from a photo detector besides the above, A servo signal operation means to detect the positional information of the above-mentioned record medium and the condensed laser beam from a photo detector besides the above, A servo means to control the location of the laser beam on the above-mentioned record medium based on the above-mentioned positional information, It is good to establish the device system means to which the location of the above-mentioned laser beam is moved, to carry out outgoing radiation of the laser beam from the above-mentioned semiconductor laser component based on the above-mentioned laser driving signal, and to record information on the above-mentioned record medium.
[0021]
[Embodiment of the Invention] Hereafter, the gestalt of implementation of this invention is concretely explained based on a drawing. Drawing 1 is the block diagram showing the configuration of the laser output-control section which is 1 operation gestalt of this invention.
[0022] The laser drive control signal of the laser mechanical component 2 according to recording-information signal:sig1 into which the modulation section 1 is inputted: Generate sig2. This laser drive control signal: Make sig2 into the enable signal according to the luminescence level (for example, Pr, Pe, Pw) of a laser diode 12.
[0023] The laser mechanical component 2 chooses the output of the constant current source section 3 which responded for every luminescence level of a laser diode 12, drives a laser diode 12 and makes it emit light. A light sensing portion 4 connects the photo detector 17 arranged so that the laser beam by which outgoing radiation was carried out from the laser diode 12 can be received, changes into an electrical signal the laser beam which received light by the photo detector 17, and outputs the output signal:sig3.
[0024] From output-signal:sig3 to the recording-information signal into which frequency characteristics are adjustable and were inputted from the light sensing portion 4 by speed-signal:sig5 to which the equalization section 5 was outputted from the speed-signal generation section 9: Remove the optical power modulation component according to sig1, output by making it only luminescence level signal:sig4 of a reduction component, and adjust the output of the constant current source section 3 through the voltage-current converter (V/I) 8.
[0025] The control signal with which the offset adder unit 6 was outputted from the offset control-signal generation section 10: Adjust luminescence level signal:sig4 based on sig6. The time amount width-of-face controller 7 outputs the fine-tuning information which adjusts the optical power modulation width of face generated in the modulation section 1.
[0026] Drawing 2 is the block diagram showing the configuration of the information record regenerative apparatus equipped with the laser output-control section shown in drawing 1 . This information record regenerative apparatus inputs into the laser output-control section 11 the recording information outputted from the controller 27, and the laser driving signal outputted from the laser output-control section 11 drives a laser diode 12, and carries out outgoing radiation of the laser beam.

[0027] It is made concurrency light with a collimate lens 13, and is reflected by the beam splitter 14, and the laser beam by which outgoing radiation was carried out from the laser diode 12 is condensed with an objective lens 15 by the recording surface on a record medium (media) 30. The laser beam reflected by media 30 passes along an objective lens 15 again, passes a beam splitter 14, and makes it condense on a photo detector 17 with a condenser lens 16. And it is changed into an electrical signal by the photo detector 17, and a regenerative circuit 21, the servo signal arithmetic circuit 22, and the rotation information detector 23 are supplied.
[0028] On the other hand, it is condensed by the photo detector 19 with a condenser lens 18 as it is, and a part of laser beam by which outgoing radiation was carried out from the laser diode 12 is sent to the laser output-control section 11. Then, the information regenerative signal digitized in the regenerative circuit 21 is sent to a latter information demodulator circuit. Moreover, in the rotation information detector 23, the rotation information signal currently recorded on media 30 is detected.
[0029] For example, the wobble (Wobble) by meandering of a slot is minced so that the CD-R media formatted by CLV can be controlled by linear velocity regularity. Therefore, since a wobble is abbreviation fixed period = linear velocity regularity, if it is made to rotate by the roll control of CAV, a wobble can be used as a signal which is no longer a fixed period and shows linear velocity.
[0030] Moreover, in the servo signal arithmetic circuit 22, the positional information of the laser spot of the laser beam on media 30 is calculated, and based on the result of an operation, the servo circuit 24 moves the device system 20 using a servo motor 25, and controls the location of a laser spot by the directions received from the controller 27 to a target position. The servo motor 25 is equipped also with the media radial location detection function of the device system 20.
[0031] The speed signal inputted into the equalization section 5: sig(s)5 are the radius positional information signal outputted from the servo motor 25, and the rotation information signal outputted from the rotation information detector 23, and change the frequency characteristics of the equalization section 5 with this signal. Moreover, the servo circuit 24 controls the spindle motor 26 made to rotate media 30 based on the output from the rotation information detector 23.
[0032] That is, each part of the above achieves the following functions, respectively. The function of a modulation means by which the above-mentioned modulation section 1 modulates the control signal of the laser drive current of a semiconductor laser component according to the information recorded on a record medium is achieved, and the function of a light-receiving means for the above-mentioned light sensing portion 4 to receive the laser beam outputted from the semiconductor laser component, and to change into an electrical signal is achieved.
[0033] Moreover, the function of an equalization means by which the above-mentioned equalization section 5 equalizes the electrical signal changed by the light-receiving means is achieved, and the function of a control means in which the above-mentioned equalization section 5 and the voltage-current converter (V/I) 8 change a laser drive current according to the electrical signal equalized by the equalization means is achieved. Furthermore, the above-mentioned speed signal generation section 9 achieves the function of the means which makes the frequency characteristics of an equalization means adjustable.
[0034] Moreover, the above-mentioned servo motor 25 achieves the function of a radius location detection means to detect the radius location of the condensing point of the laser beam on the above-mentioned record medium, and the function of a means by which the above-mentioned speed signal generation section 9 changes the frequency characteristics of an equalization means according to the radius location detected by the radius location detection means is achieved.
[0035] Furthermore, the function of a rotational-speed detection means by which the above-mentioned rotation information detector 23 detects the rotation information currently recorded on the record medium is achieved, and the function of a means by which the above-mentioned speed signal generation section 9 changes the frequency characteristics of an equalization means according to the rotation information detected by the rotational-speed detection means

is achieved.
[0036] Moreover, the funotion of the offset addition means of by_which the above-mentioned offset adder unit 6 adds offset to the electrical signal equalized by the equalization means achieves, and the function of the means change the amount of offset which the offset control signal generation section 10 adds with an offset addition means according to the radius location detected by the radius location detection means, and the means change the amount of offset add by the offset addition means according to the rotation information detected by the rotational-speed detection means achieves.
[0037] Moreover, the function of a time amount width-of-face adjustment means by which the above-mentioned time amount width-of-face controller 7 changes the time amount width of face of the control signal of the laser drive current modulated by the modulation means is achieved, and the function of a means by which the above-mentioned offset control signal generation section 10 changes the amount of offset according to the control signal with which time amount width of face was changed by the time amount width-of-face adjustment means is achieved.
[0038] Furthermore, while the above-mentioned laser diode 12 grade condenses a laser beam on a record medium and condenses the reflected light from a record medium again on other different photo detectors from a photo detector, the function of an optical-system means to irradiate a part of laser beam on a photo detector is achieved.
[0039] The above-mentioned regenerative circuit 21 achieves the function of a playback means to detect the information on a record medium from other photo detectors further again, and the above-mentioned servo signal arithmetic circuit 22 achieves a record medium and the function of a servo signal operation means to detect the positional information of the condensed laser beam, from other photo detectors.
[0040] And the above-mentioned servo circuit 24 and servo motor 25 grade achieve the function of a servo means control the location of the laser beam on a record medium based on positional information again, the above-mentioned device system 20 achieves the function of the device system means to which the location of a laser beam is moved, and the function of a means to by_which the above-mentioned laser output-control section 11 carries out outgoing radiation of the laser beam from a semiconductor-laser component based on a laser driving signal, and records information on a record medium achieves.
[0041] Next, processing of this information record regenerative apparatus is explained. The laser output-control section 11 designs the addition-and-subtraction polarity of each signal so that the output value of the equalization section 5 may be set constant. For example, when a laser beam is made to emit light with a certain constant-current-power-supply output, if the temperature of a laser beam rises, luminescence power will fall.
[0042] Then, it designs in a reverse property so that that laser beam may be received and the output voltage of the equalization section 5 may be increased, if a current is added with the constant current source output current after V/I conversion of this output voltage, since a current will increase, laser power becomes large and the output of the equalization section 5 decreases, and it converges on constant value by repeating this. Namely, what is necessary is just to keep the output of the equalization section 5 constant, in order to keep laser luminescence power constant.
[0043] Drawing 3 is the diagram of the laser temperature characteristic. The temperature characteristic of the initial state of a laser diode 12 is target laser [are Ta and] luminescence power :P Laser drive current:Ia is required to output and accumulate a. However, if long duration luminescence is carried out, laser temperature will increase, the temperature characteristic is set to Tb, and a laser diode 12 is laser luminescence power also at the same laser drive current:Ia :P Only b emits light. Therefore, the control which keeps a laser output constant also during record for forming an exact record mark is needed.
[0044] Drawing 4 is the diagram showing the frequency characteristics of the equalization section 5 when carrying out record playback of the information by CAV to the media formatted by CLV. Media rotational frequency:fsp is constant frequency because of CAV. However, reference clock frequency:finner of the inner circumference of media differs from reference clock frequency:fouter of a periphery for the media formatted by CLV.

[0045] If the frequency characteristics of the proper equalization section 5 through which the inner circumference of media and a periphery pass, respectively make inner circumference the direction shown by the drawing solid line and the direction shown by the dotted line is made into a periphery, they will turn into a reduction passage filter shape from which a reference clock frequency serves as specific magnitude-of-attenuation:Gclk.
[0046] In addition, since the laser power control band is very low on a periphery compared with informational record reproduction speed when the direction shown as a continuous line is made immobilization as frequency characteristics like before, the amount of information which carries out record playback after laser power has shifted from the optimum value increases, and exact record becomes impossible. Moreover, when the direction shown by the dotted line is made immobilization as frequency characteristics like before, in inner circumference, an optical power modulation component will not decline and it becomes the lack of equalization.
[0047] Furthermore, since not only a reference clock but media rotational frequency:fsp changes by the ZCLV method or the ZCAV method, it is effective not only a low pass filter but to put in a high pass filter (wavy line) frequency-characteristics adjustable with a frequency lower than media rotational frequency:fsp. It is a wave when that **** A shows inserts a high pass filter into drawing 4 .
[0048] Next, the signal which carries some kinds of filters about frequency-characteristics modification of the equalization section 5, and shows the recording rate at that time (speed signal): Change frequency characteristics by sig5. Moreover, it is also possible to set a reference clock to speed signal:sig5 otherwise, to carry out frequency-electrical-potential-difference conversion of this, and to constitute this electrical potential difference from a low pass filter which determines frequency characteristics as a control signal of a variable-capacity capacitor or a variable resistor.
[0049] Drawing 5 is the diagram showing actuation of output change of an optical power modulation and the equalization section 5. For example, as the above-mentioned information record regenerative apparatus, in the case of the optical disk drive recorded in an optical power modulation, especially the phase change type light disk drive which performs PWM (Pit Width Modulation) record and a WORM (postscript) disk drive, in order to form one record mark correctly, laser reinforcement is modulated to a high-speed multiple value.
[0050] (b) of drawing 5 is the diagram showing the example of the record light source on-the-strength modulated wave form of a phase change type light disk drive where the laser output of three values (Pr, Pe, Pw) was used, and (c) of drawing 5 is the diagram showing the example of the record light source on-the-strength modulated wave form of a WORM disk drive where the binary (Pr, Pw) laser output was used. As for these waves, optimum conditions change with record film properties of a record medium.
[0051] This information record regenerative apparatus can be adapted for the recording method which modulates the reinforcement of the light source at a high-speed multiple value although not only the above-mentioned wave but a record mark is formed. In addition, (a) of drawing 5 shows the record mark 31 on the media truck corresponding to a record light source on-the-strength modulated wave form.
[0052] It is drawing which (d) of drawing 5 detected the luminescence wave of (b) of this drawing by the light sensing portion 4, and expressed the output wave of the equalization section 5, and (e) of drawing 5 is drawing which expressed the output wave of the equalization section 5 of (c) of this drawing similarly. Although the optical power modulation component according to recording information is equalized as shown in both drawings, the low-pass frequency component is the reflected wave.
[0053] Moreover, as mentioned above, media linear velocity becomes early, so that it progresses to a periphery in CAV, and the reference clock for carrying out record playback of the information on the same consistency also becomes early. In this case, it becomes difficult to form in the exact configuration (die length, width of face) of a record mark, and fine tuning of a record laser luminescence wave is needed.
[0054] For example, since heat will propagation-come to be hard to the record film of media like 1X in CD-R media, and 2X if linear velocity becomes early, laser power is strengthened.

Moreover, by the media of CAV, since linear velocity differs on inner circumference and a periphery, record power is changed (for example, it enlarges on a periphery).
[0055] In this case, if it is controlling to become the constant value which fixed the output of the equalization section 5, record laser power does not become large. Therefore, by the offset adder unit 6, modification of the output of the equalization section 5 to arbitration can be enabled, and target record power can be changed.
[0056] Moreover, in order to form an exact record mark, it is good to change not only record laser power but the time amount width of face of an optical power modulation. With this time amount width of face, when generating optical power modulation width of face in the modulation section 1, it adjusts also including a finely tuned part not only according to the usual time amount width of face changed in proportion to a reference clock but linear velocity by sending fine-tuning information to the modulation section 1 from the time amount width-of-face controller 7.
[0057] Drawing 6 is drawing showing the output wave at the time of time amount width-of-face fine tuning of an optical power modulation. (a) of drawing 6 is drawing showing the optical power modulated wave form of three values (Pe, Pw, Pb) for forming the record mark piece of a certain die length, and (b) of this drawing is the wave form chart of the output signal of the equalization section 5.
[0058] In addition, a continuous line shows the optical power modulated wave form when recording information on (a) of drawing 6 by media inner circumference, and the continuous line shows the output signal of the equalization section 5 at that time to (b) of drawing 6 .
[0059] Since linear velocity is early on a media periphery, in order to obtain a desired record mark, it tunes finely so that high-power luminescence time amount may be lengthened at (a) of drawing 6 , as a dotted line shows. However, if the output of the equalization section 5 which is desired value by tuning finely by the offset adder unit 6 is kept constant, it will be made for each power level (Pe, Pw, Pb) not to change, since it differs from the value in inner circumference as average power changes and the desired value of the equalization section 5 is also shown in (b) of drawing 6 .
[0060] Then, by the offset control signal generation section 10, the signal which shows modification of target power, such as information on a radius location, linear velocity, and an optical power modulation, is generated, and it inputs into the offset adder unit 6 as control signal:sig6.
[0061] Thus, since the information record regenerative apparatus of this operation gestalt makes the frequency characteristics of the equalization section 5 adjustable, when changing a recording rate, it can maintain the laser output stabilized with the cheap means.
[0062] Moreover, since the frequency characteristics of the equalization section 5 are changed by radius positional information, when a recording rate changes with a radius location, the laser output stabilized with the cheap means can be maintained.
[0063] Furthermore, since the frequency characteristics of the equalization section 5 are changed using the rotational-speed information currently recorded on media, it cannot be concerned with the rotation approach of media, but frequency characteristics can be adjusted to real time according to the present linear velocity, and the laser output stabilized with the cheap means can be maintained.
[0064] Moreover, since the amount of offset of the equalization section 5 is changed according to a radius location or rotational speed, also when changing record power according to a radius location or rotational speed, the desired value of a laser output can be changed easily and the laser output stabilized with the cheap means can be maintained.
[0065] Furthermore, since the amount of offset of the equalization section 5 is also changed in case the time amount width of face of an optical power modulated wave form is changed, a gap of the average by having changed time amount width of face can be amended, it can control to desired value, and the laser output stabilized with the cheap means can be maintained.
[0066] And when it applies to the equipment which changes the recording rates at the time of record of the information by the CAV to the media formatted by CLV etc., the cheap and stabilized laser output can be maintained.

[0067]
[Effect of the Invention] As explained above, when recording or reproducing information by optical disk roll control methods other than CLV, such as CAV, to the optical disk in the format by CLV according to the laser power control device by this invention, it can make it possible to control by low cost to the always optimal laser luminescence power.

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the block diagram showing the configuration of the laser output-control section which is 1 operation gestalt of this invention.
[Drawing 2] It is the block diagram showing the configuration of the information record regenerative apparatus equipped with the laser output-control section shown in drawing 1 .
[Drawing 3] It is the diagram of the laser temperature characteristic.
[Drawing 4] It is the diagram showing the frequency characteristics of the equalization section 5 when carrying out record playback of the information by CAV to the media formatted by CLV.
[Drawing 5] It is the diagram showing actuation of output change of an optical power modulation and the equalization section 5.
[Drawing 6] It is drawing showing the output wave at the time of time amount width-of-face fine tuning of an optical power modulation.
[Description of Notations]
1: Modulation section 2: Laser mechanical component
3: Constant current source section 4: Light sensing portion
5: Equalization section 6: Offset adder unit
7: Time amount width-of-face controller 8: Voltage-current converter (V/I)
9: Speed signal generation section
10: Offset control signal generation section
11: Laser output-control section 12: Laser diode
13: Collimate lens 14: Beam splitter
15: Objective lens 16: Condenser lens
17: Photo detector 18: Condenser lens
19: Photo detector 20: Device system
21: Regenerative circuit 22: Servo signal arithmetic circuit
23: Rotation information detector 24: Servo circuit
25: Servo motor 26: Spindle motor
27: Controller 30: Record medium (media)
sig1: Recording information signal
sig2: Laser drive control signal
sig3: The output signal from a light sensing portion
sig4: Luminescence level signal
sig5: Speed signal
sig6: Control signal

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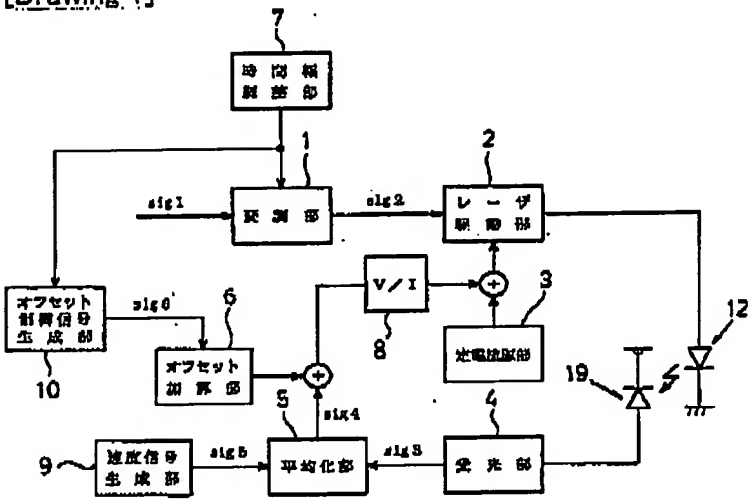
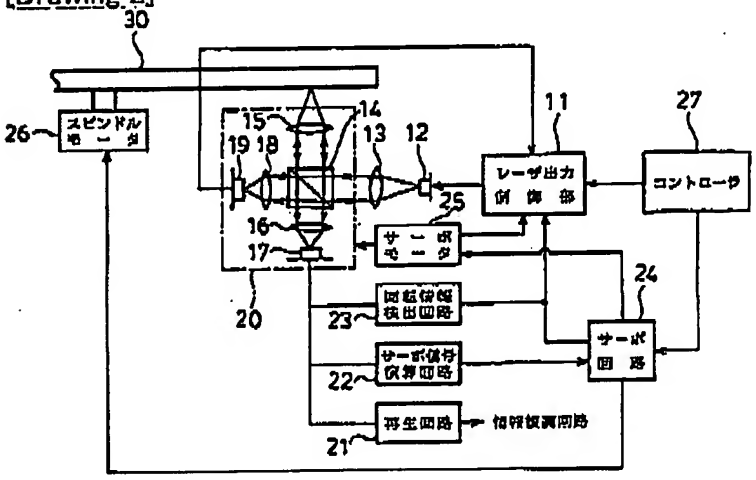
3.In the drawings, any words are not translated.

DRAWINGS

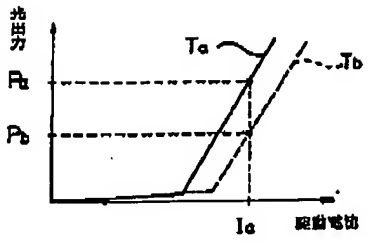
[Drawing 1]



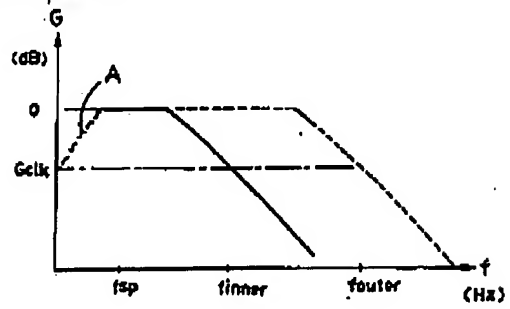
[Drawing 2]



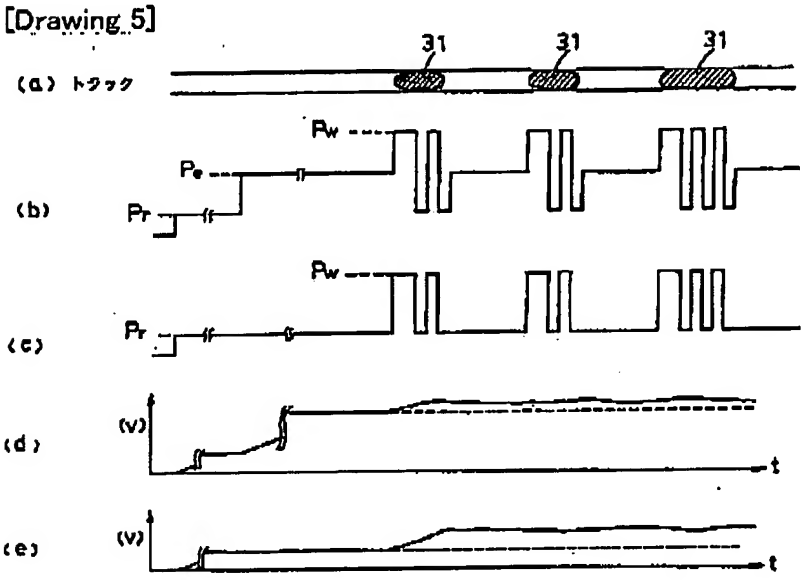
[Drawing 3]



[Drawing 4]



[Drawing 5]



[Drawing 6]